Amendments to the Claims:
This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Cancelled)

2. (Currently amended) A receiver according to claim [[1]] 18, wherein the updating means comprises means for adjusting said parameters in dependence upon channel characteristics of all user channels.

3. (Previously presented) An array receiver for processing signals received from a plurality of transmitting users via an array antenna having an array of N antenna elements providing a set of antenna signals (x_1, x_2,..., x_N), respectively, each comprising information from each user,

wherein said receiver has

a common preprocessing section for sampling each of the antenna element signals (x_1, x_2,..., x_N) and processing the samples of at least some of said antenna signals to form a plurality of basis signals ($\mathbf{y}_0$,..., $\mathbf{y}_M$) together having fewer space-time dimensions than the space-time dimensions of the combined antenna signals, and

a plurality of signal processing units each having a plurality of inputs coupled to the common preprocessing section for receiving all of the basis signals, each processing unit processing and combining said basis signals to produce a respective one of a set of estimated received signals (z_0,..., z_M) each for a corresponding desired one of the users,

the common preprocessing section comprising

filtering means for combining all of the antenna signals (x_1, x_2,..., x_N) to provide said plurality of basis signals ($\mathbf{y}_0$,..., $\mathbf{y}_M$), each of the basis signals comprising a different combination of the antenna signals,

each of the signal processing units combining the basis signals to provide a user-specific output signal,

and updating means for periodically updating parameters of the filtering means used for deriving each particular basis signal such that each user-specific output signal will exhibit a desired optimized concentration of energy of that desired user's received signal as received by the array antenna, and

wherein each of the processor units comprises means for weighting the basis signals (y_0,..., y_M) before combining same, the weights (w_{00},..., w_{MM}) being adjusted in dependence upon channel characteristics of all user channels,

and the parameters of the filtering means are updated less frequently than the weights (w_{00},..., w_{MM}) of the processor units.

4. (Currently amended) A receiver according to claim [[1]] 18, wherein the number of basis signals is equal to the number of desired user signals.

5. (Currently amended) A receiver according to claim [[1]] 18, wherein the common preprocessing section (40) comprises M+1 dominant subspace filters (40/0, ..., 40/M) producing a set of basis signals $\mathbf{y}_m = [y_{m,1}, ..., y_{m,\mu}]$ where m is the index of the filter, and m = 0, 1, ..., M, said basis signals $\mathbf{y}_m$ being projections of the input signals (x_{11}, x_{12}, ..., x_{1L}, x_{21}, x_{22}, ..., x_{2L}, ..., x_{N1}, x_{N2}, ..., x_{NL}) onto the [[R]] μ dimensions of the subspace occupied by signal m which carry the most energy.

6. (Previously presented) An array receiver for processing signals received from a plurality of transmitting users via an array antenna having an array of *N* antenna elements providing a set of antenna signals (x_1, x_2,..., x_N), respectively, each comprising information from each user,

wherein said receiver has

a common preprocessing section for sampling each of the antenna element signals (x_1, x_2,..., x_N) and processing the samples of at least some of said antenna signals to form a plurality of basis signals (y_0,..., y_M) together having fewer space-time dimensions than the space-time dimensions of the combined antenna signals, and

a plurality of signal processing units each having a plurality of inputs coupled to the common preprocessing section for receiving all of the basis signals, each processing unit processing and combining said basis signals to produce a respective one of a set of estimated received signals (z_0,..., z_M) each for a corresponding desired one of the users,

the common preprocessing section comprising

filtering means for combining all of the antenna signals (x_1, x_2,..., x_N) to provide said plurality of basis signals (y_0,..., y_M), each of the basis signals comprising a different

combination of the antenna signals,

each of the signal processing units combining the basis signals to provide a user-specific output signal,

and updating means for periodically updating parameters of the filtering means used for deriving each particular basis signal such that each user-specific output signal will exhibit a desired optimized concentration of energy of that desired user's received signal as received by the array antenna,

wherein the updating means comprises

a training sequence generator for generating a training sequence for the corresponding user,

covariance matrix estimation means responsive to the training sequence and the antenna signals for providing a covariance matrix embodying long-term statistics for the channel of that user, and

eigenvector estimation means for extracting from said covariance matrix at least the dominant eigenvector constituting said linear combination, elements of said dominant eigenvector being applied to said filtering means as weights for updating said parameters.

7. (Currently amended) A receiver according to claim [[1]] 18, wherein the filtering means comprises a plurality of filters each comprising a filter matched to a respective one of the space-time channel ~~characteristics~~ signatures of the desired users.

8. (Previously presented) A receiver for receiving signals from a plurality of transmitting users via an array antenna having an array of N antenna elements providing a set of antenna signals (x_1, x_2, ... x_N), respectively, each comprising information from each user, said receiver comprising a common preprocessing section followed by a plurality of receiver sections, each corresponding to a different one of the users and coupled to the outputs of the common preprocessing section, the preprocessing section sampling each of the antenna signals (x_1, x_2,..., x_N) and processing the samples of at least some of said antenna element signals to form a plurality of basis signals ($\boldsymbol{y}_0$,..., $\boldsymbol{y}_M$) together having fewer space-time dimensions than the space-time dimensions of the combined antenna signals, and a plurality of signal processing units each having a plurality of inputs coupled to the common preprocessing section for receiving all of the

basis signals, each processing unit processing and combining said basis signals to produce a respective one of a set of estimated received signals (z_0,..., z_M) each for a corresponding desired one of the users,

the common preprocessing section comprising

(i) means for maintaining through periodic updates a set of dominant subspace filters, each of which being matched to one of the users of interest, and the outputs of which being used by the subsequent receiver sections, to be processed and combined in order to yield an estimate of the desired signal for each user of interest;

(ii) means for periodically estimating and/or updating the component weights of the dominant subspace filters by correlation, with a known training sequence or with the user's spreading code in a CDMA system or with any other signal strongly correlated with the user of interest's signal, in combination with appropriate temporal averaging to isolate subspace-level information, as opposed to instantaneous channel characteristics; and

(iii) means for periodically or dynamically estimating and/or updating the component weights and/or any other parameters of interest of the receiver sections fed from the preprocessing section in a manner and at a rate such that instantaneous channel changes are tracked to provide a reliable and consistent estimate of the desired signal.

9. (Cancelled)

10. (Cancelled)

11. (Currently amended) A method according to claim [[10]] 20, wherein the updating step adjusts said parameters in dependence upon channel characteristics of all user channels.

12. (Previously presented) A method of receiving signals from a plurality of transmitting users via an array antenna having *N* antenna elements providing a set of antenna signals (x_1, x_2,..., x_N), respectively, each comprising information from each user, the method comprising the steps of:

sampling each of the antenna signals;

preprocessing the samples of at least some of said antenna element signals (x_1, x_2,..., x_N) to form a plurality of basis signals ($\boldsymbol{y}_0$,..., $\boldsymbol{y}_M$) together having fewer space-time dimensions than

the space-time dimensions of the combined antenna signals,

processing and combining said basis signals (y_0,..., y_M) to produce a set of estimated received signals (z_0,..., z_M) each for a corresponding one of the users,

the preprocessing including the steps of

combining all of the antenna signals (x_1, x_2,..., x_N) to provide said plurality of basis signals (y_0,..., y_M) such that each of the basis signals comprises a different combination of the antenna signals,

the processing and combining step comprising the step of combining the basis signals (y_0,..., y_M) to provide a series of user-specific output signals,

the method further comprising the step of periodically updating parameters used for deriving each particular basis signal such that each user-specific output signal will exhibit a desired optimum concentration of energy of the received signal of that particular user as received by the array antenna,

wherein the updating step adjusts said parameters in dependence upon channel characteristics of all user channels, each step of processing the basis signals weights the basis signals before combining same, and adjusts the weights in dependence upon channel characteristics of all user channels, and wherein the parameters are updated less frequently than the weights.

13. (Currently amended) A method according to claim [[10]] 20, wherein the number of basis signals is equal to the number of desired user signals.

14. (Currently amended) A method according to claim [[10]] 20, wherein the step of preprocessing the samples uses M+1 dominant subspace filters to produce a set of basis signals $\mathbf{y}_m = [y_{m,1}, ..., y_{m,\mu}]$ where m is the index of the filter, and m = 0, 1, ..., M, said basis signals $\mathbf{y}_m$ being projections of the input signals (x_{11}, x_{12}, ..., x_{1L}, x_{21}, x_{22}, ..., x_{2L}, ..., x_{N1}, x_{N2}, ..., x_{NL}) onto the μ dimensions of the subspace occupied by signal m which carry the most energy.

15. (Previously presented) A method of receiving signals from a plurality of transmitting users via an array antenna having *N* antenna elements

providing a set of antenna signals (x_1, x_2,..., x_N), respectively, each comprising information from each user, the method comprising the steps of:

sampling each of the antenna signals;

preprocessing the samples of at least some of said antenna element signals (x_1, x_2,..., x_N) to form a plurality of basis signals (y_0,..., y_M) together having fewer space-time dimensions than the space-time dimensions of the combined antenna signals,

processing and combining said basis signals (y_0,..., y_M) to produce a set of estimated received signals (z_0,..., z_M) each for a corresponding one of the users,

the preprocessing including the steps of

combining all of the antenna signals (x_1, x_2,..., x_N) to provide said plurality of basis signals (y_0,..., y_M) such that each of the basis signals comprises a different combination of the antenna signals,

the processing and combining step comprising the step of combining the basis signals (y_0,..., y_M) to provide a series of user-specific output signals,

the method further comprising the step of periodically updating parameters used for deriving each particular basis signal such that each user-specific output signal will exhibit a desired optimum concentration of energy of the received signal of that particular user as received by the array antenna,

the method further comprising the step of generating a training sequence for each user,

the updating step being responsive to the training sequence of a particular user and the antenna signals to provide a covariance matrix embodying long-term statistics for the channel of that user, and using eigenvector estimation means for extracting from said covariance matrix at least the dominant eigenvector, elements of said dominant eigenvector being employed for updating said parameters.

16. (Currently amended) A method according to claim [[10]] 20, wherein the step of combining all of the antenna signals uses a plurality of filters each matched to a respective one of the desired users.

17. (Previously presented) A method of receiving signals from a plurality of transmitting users using an array antenna having an array of antenna elements and a receiver comprised of a common prefiltering section followed by a plurality of receiver sections, each corresponding to a different one of the users and coupled to the outputs of the common prefiltering section, the

method comprising the steps of

(i) maintaining through periodic updates a set of dominant subspace filters, each matched to one of the users of interest, and the outputs of which being used by the subsequent receiver sections, to be processed and combined in order to yield an estimate of the desired signal for each user of interest;

(ii) periodically estimating and/or updating the component weights of the dominant subspace filters by correlation with at least one of (a) a known training sequence, (b) the user's spreading code where the method is used in a CDMA system, and (c) any other signal strongly correlated with the signal of the user of interest, in combination with appropriate temporal averaging to isolate subspace-level information, as opposed to instantaneous channel characteristics; and

(iii) periodically or dynamically estimating and/or updating the component weights and/or any other parameters of interest of the receiver sections fed from the prefiltering section in a manner and at a rate such that instantaneous channel changes are tracked to provide a reliable and consistent estimate of the desired signal.

18. (New) An array receiver for processing signals received from a plurality (M+1) of co-channel transmitting users via an array antenna having an array of (N) antenna elements to obtain a set of user-specific estimated received signals (z_0,..., z_M) each corresponding to a respective one of said transmitting users, said array receiver having:

radio frequency units (26/1,..., 26/N) for conversion of signals from the array antenna to provide a corresponding set of (N) antenna element signals (x_1, x_2,..., x_N), respectively, where N is at least equal to the number (M+1) of transmitting users, each of the antenna element signals (x_1, x_2,..., x_N) comprising information from each of the plurality (M+1) of transmitting users,

a common preprocessing section (40) for receiving and processing the (N) antenna element signals (x_1, x_2, ..., x_N) from the radio frequency units (26/1 ... 26/M) to provide a plurality (M+1) of basis signals (y_0, ..., y_M), and

a plurality (M+1) of signal processing units (60_0,..., 60_M) each for processing said basis signals (y_0, ..., y_M) to provide a respective one of said user-specific estimated received signals (z_0,..., z_M),

wherein the common preprocessing section (40) comprises

filtering means (40/1, ..., 40/M) for sampling each of the (N) antenna element signals (x_1, x_2,..., x_N) and combining resulting samples of at least some of said antenna element signals (x_1, x_2,..., x_N) to provide said plurality of (M+1) basis signals (y_0..., y_M), each of the basis signals (y_0,..., y_M) comprising a different combination of the antenna element signals (x_1, x_2,..., x_N) and having μ dimensions spanning a dominant subspace containing most of the energy from a respective one of the transmitted user signals, said (M+1) basis signals (y_0,..., y_M) together having fewer space-time dimensions (μx(M+1)) than the space-time dimensions (NxL) of the (N) combined antenna element signals (x_1, x_2,..., x_N), where L is the maximum length of the channel impulse response in symbol periods,

and

updating means for periodically updating parameters of the filtering means (40/1, ..., 40/M) used for deriving each particular basis signal such that each of the user-specific estimated received signals (z_0, z_1,... z_M) will exhibit a desired optimized concentration of energy;

and wherein each of said signal processing units (60_0,..., 60_M) has

a plurality of inputs coupled to the common preprocessing section (40) for receiving therefrom all of the (M+1) basis signals (y_0,..., y_M), and is

adapted for processing and combining at least some of said (M+1) basis signals (y_0,..., y_M) to produce a respective one of said set of user-specific estimated received signals (z_0,..., z_M) for a corresponding desired one of the plurality (M+1) of transmitting users.

19. (New) An array receiver system comprising an array antenna having a plurality (N) of antenna elements in combination with an array receiver for processing signals received from a plurality (M+1) of co-channel transmitting users via said array antenna to obtain a set of user-specific estimated received signals (z_0,..., z_M) each corresponding to a respective one of said transmitting users, wherein said array receiver has:

radio frequency units (26/1,..., 26/N) for conversion of signals from the array

antenna to provide a corresponding set of (N) antenna element signals (x_1, x_2,..., x_N), respectively, where N is at least equal to the number (M+1) of transmitting users, each of the antenna element signals (x_1, x_2,..., x_N) comprising information from each of the plurality (M+1) of transmitting users,

a common preprocessing section (40) for receiving and processing the (N) antenna element signals (x_1, x_2, ..., x_N) from the radio frequency units (26/1 ... 26/M) to provide a plurality (M+1) of basis signals (y_0, ..., y_M), and

a plurality (M+1) of signal processing units (60_0,..., 60_M) each for processing said basis signals (y_0, ..., y_M) to provide a respective one of said user-specific estimated received signals (z_0,..., z_M),

wherein the common preprocessing section (40) comprises

filtering means (40/1, ..., 40/M) for sampling each of the (N) antenna element signals (x_1, x_2,..., x_N) and combining resulting samples of at least some of said antenna element signals (x_1, x_2,..., x_N) to provide said plurality of (M+1) basis signals (y_0..., y_M), each of the basis signals (y_0,..., y_M) comprising a different combination of the antenna element signals (x_1, x_2,..., x_N) and having μ dimensions spanning a dominant subspace containing most of the energy from a respective one of the transmitted user signals, said (M+1) basis signals (y_0,..., y_M) together having fewer space-time dimensions (μx(M+1)) than the space-time dimensions (NxL) of the (N) combined antenna element signals (x_1, x_2,..., x_N), where L is the length of the channel impulse response in symbol periods,

and

updating means for periodically updating parameters of the filtering means (40/1, ..., 40/M) used for deriving each particular basis signal such that each of the user-specific estimated received signals (z_0, z_1,... z_M) will exhibit a desired optimized concentration of energy;

and wherein each of said signal processing units (60_0,..., 60_M) has

a plurality of inputs coupled to the common preprocessing section (40) for receiving therefrom all of the (M+1) basis signals (y_0,..., y_M), and is

adapted for processing and combining at least some of said (M+1) basis signals (y_0,..., y_M) to produce a respective one of said set of user-specific

estimated received signals (z_0,..., z_M) for a corresponding desired one of the plurality (M+1) of transmitting users.

20. (New) A method of receiving signals from a plurality (M+1) of co-channel transmitting users via an array antenna having an array of (N) antenna elements providing a set of antenna element signals (x_1, x_2,..., x_N), respectively, to obtain a set of user-specific estimated received signals (z_0,..., z_M) each corresponding to a respective one of said transmitting users, the method comprising the steps of:

using radio frequency units (26/1,..., 26/N), converting signals from the array antenna to provide a corresponding set of (N) antenna element signals (x_1, x_2,..., x_N), respectively, where N is at least equal to the number (M+1) of transmitting users, each of the antenna element signals (x_1, x_2,..., x_N) comprising information from each of the plurality (M+1) of transmitting users,

using a common preprocessing section (40), receiving and processing the (N) antenna element signals (x_1, x_2, ..., x_N) from the radio frequency units (26/1 ... 26/M) to provide a plurality (M+1) of basis signals (y_0, ..., y_M), and

using a plurality (M+1) of signal processing units (60_0,..., 60_M), processing said basis signals (y_0, ..., y_M) to provide said user-specific estimated received signals (z_0,..., z_M),

wherein the receiving and processing step comprises the steps of

using filtering means (40/0,..., 40/M), sampling each of the (N) antenna element signals (x_1, x_2,..., x_N) and combining resulting samples of at least some of said antenna element signals (x_1, x_2,..., x_N) to provide said plurality of (M+1) basis signals (y_0..., y_M), each of the basis signals (y_0,..., y_M) comprising a different combination of the antenna element signals (x_1, x_2,..., x_N) and having μ dimensions spanning a dominant subspace containing most of the energy from a respective one of the transmitted user signals, said (M+1) basis signals (y_0,..., y_M) together having fewer space-time dimensions (μx(M+1)) than the space-time dimensions (NxL) of the (N) combined antenna element signals (x_1, x_2,..., x_N), where L is the length of the channel impulse response in symbol periods,

and

periodically updating parameters of the filtering means (40/0, ..., 40/M) used for deriving each particular basis signal such that each of the user-specific estimated received signals (z_0, z_1,... z_M) will exhibit a desired optimized concentration of energy;

and wherein the step of processing the basis signals (y_0, ..., y_M) comprises the steps of

receiving from the common preprocessing section (40) all of the (M+1) basis signals (y_0,..., y_M), and

processing and combining at least some of said (M+1) basis signals (y_0,..., y_M) to produce each of said set of user-specific estimated received signals (z_0,..., z_M) for a corresponding desired one of the plurality (M+1) of transmitting users.